CHEMINSTRUMENTS

LOOP TACK TESTER

MODEL LT-1000

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PRODUCT DESCRIPTION

Congratulations on the purchase of your new ChemInstruments LT-1000 Loop Tack Tester. This versatile, user-friendly, carefully designed instrument allows you to determine loop tack values of adhesive laminates.

The unit has the following features:

- Automated test sequence.
- Selectable units of measure; Kilograms, grams, Newtons, Pounds, & ounces.
- Stores up to 20 test in memory.
- Collected test data can be exported via RS232 port.
- Stored test data is available for review.
- Compatible with optional EZ-Lab System.

UNPACKING

ChemInstruments has made every effort to ensure that the LT-1000 arrives at your location without damage. Carefully unpack the instrument and check for any damage that might have occurred during shipment. If any damage did occur during transit, notify the **carrier** immediately.

The ChemInstruments LT-1000 consists of the following parts:

- The test frame, which includes the motor/drive mechanism and the data acquisition system.
- An envelope with this manual.
- Grip and fastening pin.

Make sure all of these components are present before discarding packaging material.

ASSEMBLY

Carefully remove the test frame/data acquisition assembly from the packaging and set it on a sturdy bench top. The space required for the unit is approximately 12" wide x 15" deep x 16" high. As with any precision piece of test equipment, it is preferable to locate the LT-1000 in an area where temperature and humidity are controlled to standard conditions (72 ± 2°F, 50 ± 5% relative humidity).

Attach the Grip to the load cell mounting yoke using the small straight pin to hold it in place. Make sure the sample grip is mounted with the flip lever toward the front. Connect the power cord to its receptacle on the backside of the control cabinet. Complete the connection by inserting the male end of the power cord into an appropriate AC outlet. Notice that the on/off power switch is located directly beside the power cord receptacle on the backside of the test frame. (See Photo 1 – LT-1000 Cabinet Back)

The ChemInstruments LT-1000 is now ready for calibration and use. Before proceeding with calibrating the LT-1000, it is advisable to become familiar with the Key Components of the LT-1000. These Key Components and a brief description of their function follow in the next section.

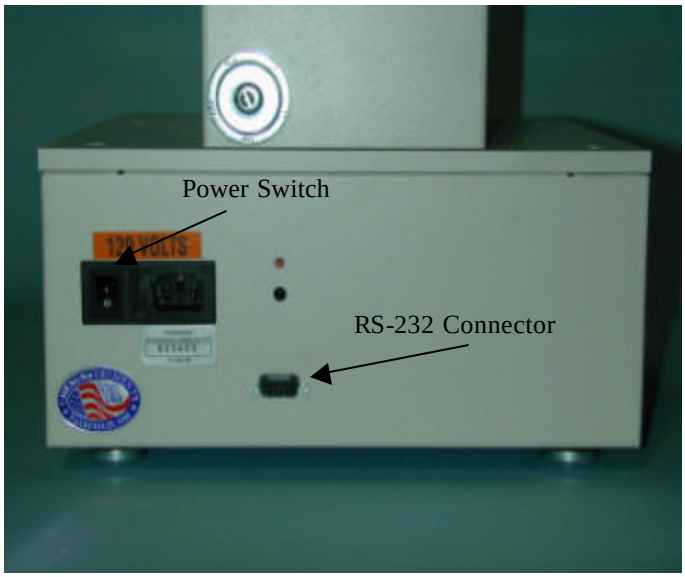


Photo 1 - LT-1000 Cabinet Back

KEY COMPONENTS (See Photos 1 and 2)

- **POWER SWITCH** is located on the back panel of the control cabinet directly beside the power cord connection.
- **TEST PANEL BRACKET** provides a holder for a standard 1-inch wide test panel.
- **LOAD CELL ASSEMBLY** consists of the mounting bracket for the load cell with grip.
- **GRIP** secures the test sample loop to the load cell.
- **MAST** the track that the load cell assembly travels during the testing cycle.
- **DIGITAL DATA DISPLAY** provides test data results and system status information.
- **PROGRAM STATUS INDICATOR** these three LED lights identify the operating status, either; Run, Print, or Setup Menus are active when LED light is on.
- **UNITS INDICATOR** there are five LED lights indicating the units of measure for the data collected. They are, Kilograms, grams, Newtons, Pounds, and ounces.
- **CONTROL KEYS** control the various features of the data acquisition and operating system. There are 5 keys consisting of Select, Enter, Up↑, Down↓, and Units.
- **RS232 CONNECTION** data output port for downloading test data.

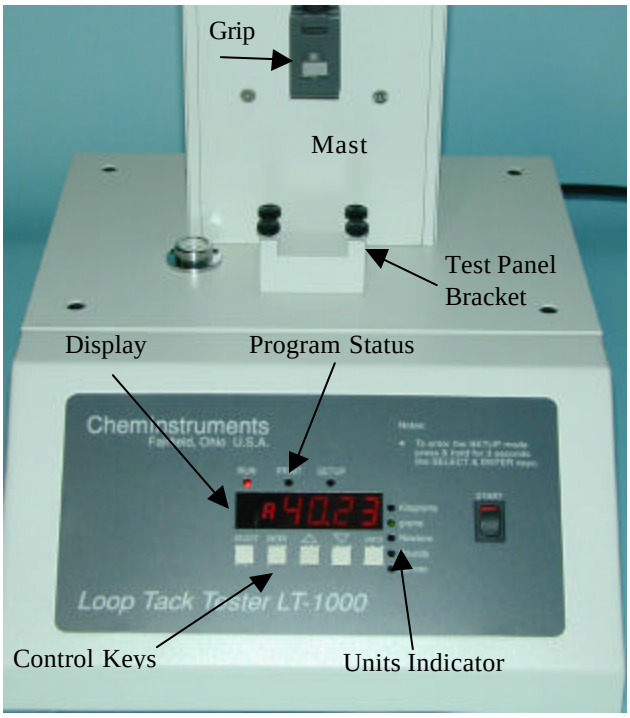


Photo 2 – LT-1000

OPERATION

THEORY OF OPERATION

A pressure-sensitive adhesive laminate sample is formed into a standard loop. This loop, with the adhesive on the outside, is brought into contact with a standard test panel and retracted at a set speed. An electronic load cell measures the tack force, then feeds the information to a data acquisition unit. The data acquisition unit collects the data from the load cell and stores these data points in memory for use in calculating the maximum, minimum and average values. The data acquisition unit assigns a file number and saves the results in memory. This data can be downloaded through the RS232 connection port, to an appropriate receiving program on your PC.

POWER UP

Turn on the master power switch, located on the back panel of the control cabinet directly next to the power line receptacle. The onboard computer will go through a self-test and then display the high (peak) force for the last test. The system is now ready for conducting the next loop tack test.

MENU FORMAT

There are three distinct Menus for the LT-1000. They are the Run menu, Print menu, and Setup menu. Each menu has an indicator light that will be on when that menu is active. Within each menu there are a series of modes that display the data collected, calibration sequence, and data storage/transfer.

Each of the three menus uses the Up ↑ and Down ↓ arrow keys to access the modes within the menu. When the desired mode is displayed the Enter key is used to access the parameter settings for that mode. Once a parameter selection is made the Enter key is used to record the setting and return to the Run menu.

The following is an outline of the three menus and the modes contained within each menu. Use this chart to quickly identify the location and proper path to access any of the settings.

RUN MENU

Modes

I	Instantaneous force
A	Average of last test
H	Maximum of last test
L	Minimum of last test

PRINT MENU

Modes

P	Data transfer to PC
St	Data storage on/off
dL	Data storage delete

SETUP MENU

Modes

F	Force
LC	Low calibration
HC	High calibration
rS	Remote
bE	Beep on/off

There is also a Units key that allows you to change the unit of measure to any of the five choices, Kilograms, grams, Newtons, Pounds, & ounces. The green LED lights to the right of the display indicate the current active unit of measure.

LOAD CELL CALIBRATION

It is important to calibrate the load cell to ensure that reliable data will be gathered. A calibration procedure is built into the software of the LT-1000. This procedure should be followed upon first use of the LT-1000 and whenever necessary thereafter. The following is the step-by-step procedure for calibrating the load cell.

MAKE SURE THE LT-1000 HAS BEEN ON AND RUNNING FOR 20 MINUTES BEFORE PROCEEDING WITH CALIBRATION. TO AVOID THIS WARM-UP PERIOD, LEAVE THE LT-1000 POWER ON WHEN NOT IN USE.

CALIBRATION PROCEDURE

1. Move the Load cell assembly containing the load cell to the upper idle position. Make sure the engaging pin is activated to lock the assembly in this position.
2. Confirm that the Grip is properly attached to the load cell mounting yoke and secured by the mounting pin.
3. Simultaneously press the Select and Enter keys for 3 seconds to access the Setup menu.
4. When the "F" is visible on the Display, press the Enter key to access the calibration sequence.
5. At the "LC" display, determine the Low Offset Value desired (Typically 0.00). Make sure that you **do not** have a weight hanging from the Grip, and press the Enter key. The display will change to, HC for high calibration value.

NOTE: the calibration sequence defaults to grams as the unit of measure. Make sure your calibration weights and entries are in grams.

6. At the "HC" display select a calibration weight close to the maximum expected test value and hang that weight in the mouth of the Grip so that it hangs straight down.
7. Set the High Offset Value on the Display to correspond with the selected calibration weight. You can change the displayed value by pressing the Up ↑ and Down ↓ keys.
8. Make sure the **calibration weight is completely at rest**, and then press the Enter key. The display will change to the "I" mode showing the current reading of force.

9. Verify the calibration by hanging a **different calibration weight** on the Grip. Confirm that the instantaneous force reading is the same as the selected weight hanging from the Grip.
10. Repeat the calibration procedure if necessary.

SCALE

A current force reading is available by accessing the "I" mode in the Run menu. To access this mode, simply press the Up↑ key until the display shows "I ####" where the # will be the current force being measured. This reading should be used only as a quick reference.

NOTE: It is important to remember that the load cell is measuring forces at a rate of 400 times per second. The rate of display on the display screen cannot cycle at this speed. Therefore, the value in the "Scale" reading is only one of the many data points that the load cell is measuring and it is not necessarily representative of the total data reading.

AUDIBLE BEEP

The LT-1000 has an audible beep feature that sounds each time a Control Key is pressed. This provides confirmation that electrical contact has been made by the key. This audible beep feature may be turned off by following this procedure.

1. Simultaneously press the Select and Enter keys for 3 seconds to access the Setup menu.
2. From the Setup menu, press the Up ↑ key to select the Beep mode.
3. When the display shows "bE", press the Enter key to access the settings.
4. Press the Up ↑ or Down ↓ keys to turn the beep feature off or on.
5. After selecting the appropriate setting press the Enter key to activate your choice and return to the Run menu.

RUNNING A TEST

Loop tack tests are conducted according to written test methods, such as ASTM, PSTC, TLMI and others. These tests are preformed to determine the tack adhesive values of the selected PSA material as it is removed from a stainless steel test panel. The LT-1000 will accommodate test panels with dimensions of 1" wide by any length.

Make sure the load cell has been calibrated before conducting a test.

TEST PROCEDURE

The ChemInstruments Loop Tack Tester is very simple to use. The following is the correct procedure for running a Loop Tack Test:

1. Thoroughly clean a 1" x 6" test panels with a strong solvent such as methyl Alcohol or Methyl Ethyl Ketone. The test panel should be made of 304 Bright Annealed Stainless Steel with a surface height roughness of 2 micro inches ± 1 micro inch.
2. Insert a 1" x 6" test panel into the panel holder. Suitable test panels are available from ChemInstruments.
3. Remove the Grip by removing the release pin. Carefully slide the Grip straight down until it is clear of the mounting yoke.
4. Cut a test specimen 1" x 5" with the long dimension in the machine direction.
5. Completely remove the release liner from the specimen.
6. Bend the specimen back onto itself, being careful not to crease it, forming a teardrop shaped loop with the adhesive surface towards the outside.

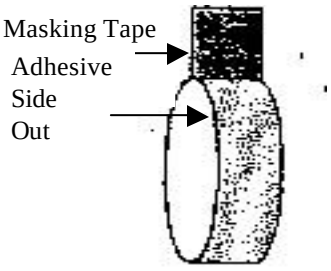


Figure 1 – Loop Tack Specimen

7. Fasten the ends together using a strip of 1/2" wide masking tape. (See Figure 1 – Loop Tack Specimen)
8. Insert the tape loop into the specimen Grip until it touches the spring block near the center of the Grip to ensure squareness of the sample.
9. Replace the Grip using the release pin to secure it in the mounting yoke.
10. Support the Load Cell Assembly to prevent the

assembly from falling while pulling on the Release Button to lower the Load Cell Assembly to the test position

11. Turn the Power Switch to ON.
12. Press the Start Switch and hold it until the Load Cell Assembly starts to move. The machine will complete one full test cycle and automatically stop when finished.

NOTE : Since the testing area is one square inch, a 1" x 6" test panel may be used several times. After completing a test, slide the test panel to one side in order to expose a clean spot on the panel. Ensure that the footprint of nylon screws from previous test do not interfere with current test.

GRIP OPERATION

The grip opens by moving the lever to its down position (See Figure 2b – Grip Open). Insert the free end of the sample into the open grip and close the grip by moving the lever to its upright position (See Figure 2a – Grip Closed). The grip opening may be adjusted by rotating the lever – clockwise for thinner samples, counterclockwise for thicker samples.

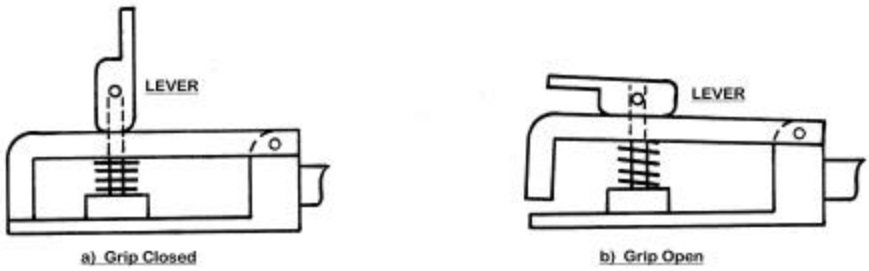


Figure 2 - Grip Operation

NOTE: The grip is attached directly to the load cell. Do not move the grip sideways or up and down. When opening and closing the grip, support it with one hand and operate the lever with the other hand to avoid damaging the load cell. For proper operation of the load cell it is necessary for the grip to be mounted with a space between the load cell housing and the grip.

WARNING: Rotating the Grip on the threaded mounting rod, causing the Grip to come in contact with the wall of the load cell housing will damage the load cell. There must be a physical gap maintained between the Grip and the load cell housing for the load cell to function correctly. DO NOT TIGHTEN THE GRIP AGAINST THE LOAD CELL HOUSING

FILE MANAGEMENT

There are four file management functions available in the LT-1000. They are Review, Download, Store, and Delete. These four functions are available in three different modes within the Print Menu. The following sections describe each of these modes and the procedure for enacting each.

REVIEWING TEST DATA

When the Data Storage is turned on, test data is maintained in the memory of the LT-1000. This data is accessible for reviewing, downloading and deleting. The following procedures will describe how to review data contained within each test file.

1. Press the Select key to access the Print menu. The Display will show the letter "P" indicating Print mode.
2. Press the Enter key to access the Print mode.
3. The Display will show "P ####" where # represents the number of the test currently stored in memory.
4. Pressing the Down ↓ and Up ↑ key will allow you to select any of the individually stored test files, each one indicated by a different number.
5. After selecting the file number to be reviewed, press the Select key two (2) times to access that particular file's data. The Display will change to the "I" or current force reading.
6. Pressing the Up ↑ key will change the display from "I" to "Average, High, and then Low." The numerical values displayed are the test results stored for the selected test file in the Print mode.
7. A new test can be run while in the review mode. Simply set up your test material in the Grip, make sure you have a clean test panel in place and push the Start button. The Display will revert to the current test data at the conclusion of the test.

NOTE: The current test data, (Average, High, and Low values) are always accessible in the Run menu by pressing the Up - key. Each push of the Up - key changes the display in the following sequence: I current, A average, H high, and L low.

DOWNLOADING TEST DATA

Any data stored in a test file can be downloaded to an appropriate receiving program on a PC. This procedure is easily accomplished but requires three additional items besides the LT-1000. You will need a RS232 9 pin serial cable, a PC, and an appropriate receiving program such as ChemInstruments EZStats.

1. Connect the RS232 cable to the 9-pin connector on the back of the Display Cabinet of the LT-1000. (See Photo 1 – LT-1000 Cabinet Back)
2. Connect the other end of the cable to your comm. port on your PC (usually comm. 1).
3. Access the software program EZStats and proceed to the "Capture Data" mode.
4. Press the Select key to select the Print menu. At the "P" display, press the Enter key.
5. Press the Down ↓ or the Up ↑ key to select the stored test file you want to download.

NOTE: Make sure you have selected "Capture Data" in your EZStats program before proceeding to the next step.

6. After selecting the test file number to be downloaded, press the Enter key to start the download of the test file. Downloading will only take a few seconds and the Display will count down the number of data points being transferred.

DATA STORAGE

The LT-1000 can store test files in the memory or operate without storing test files. The following procedure describes how to turn the memory storage function on and off.

1. Press the Select key to select the Print Menu. The Display will initially show the "P" mode.
2. Press the Up ↑ to select the "St" storage mode.
3. Press the Enter key to access the Storage mode. The Display will show either, "St On" or "St OFF".
4. Pressing the Up ↑ or Down ↓ key will toggle the Display between "St On" and "St OFF". When the St On is selected the LT-1000 will store up to 20 individual tests in files.
5. Press the Enter key to record the setting and return to the Run menu.

DELETING TEST DATA

The storage limit of the LT-1000 memory is 20 tests. When this limit is reached, an error message, “SE FULL” is displayed. It is then necessary to delete test data from the memory in order to allow additional test data to be stored. Deleting test files before the memory is full is also accomplished with this procedure.

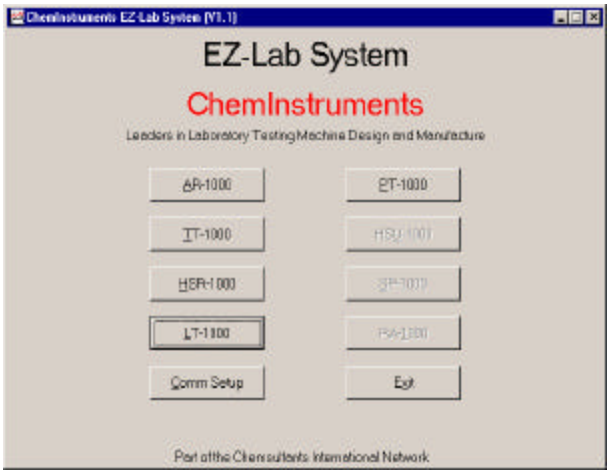
1. Press the Select key to access the Print Menu. The Display will show the letter “P” indicating Print mode.
2. Press the Up ↑ key until “dL”is displayed. Then press the Enter key to access the Delete mode. The Display will show “dl 00##” where the ## indicates the number of test files stored in memory.
3. Pressing the Select and Enter keys together for 3 seconds will delete the stored test files and return the Display to the Run Menu and “I” mode.

EZ-LAB SYSTEM

INSTALLATION

Your LT-1000 has the dual capability of operating as a stand-alone system or as a slave test platform with the remote Windows EZ-Lab system on your computer. The following procedure describes how to use the LT-1000 as a slave test platform with the remote Windows EZ-Lab system. Should you have any problems or questions after following this procedure, please call ChemInstruments at 513-860-1598 or contact us by email at, ci@fuse.net.

1. Insert the EZ-Lab program disk into the computer designated to run the LT-1000.
2. Select **RUN, (Drive):\Setup.exe**
3. Follow the on screen instructions to complete the software installation.
4. Connect the LT-1000's RS232 connection to the appropriate port (usually com 1) on your computer with the provided 9 pin serial cable.
5. Enter the setup mode of the LT-1000 test platform by pressing and holding the SELECT and ENTER buttons simultaneously for 3 seconds.
6. Use the UP ? key to cycle through the menu until "**rS**" is displayed.
7. Press the ENTER key.



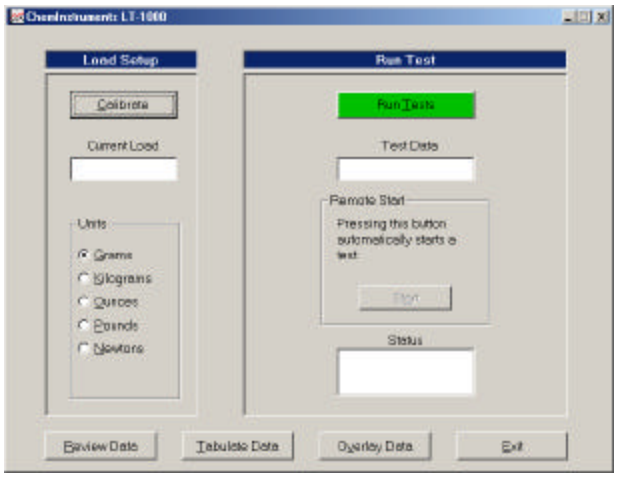
Screen 1 - EZ-Lab Main Screen

8. Use the UP ? key to cycle the display from "**OFF**" to "**ON**".
9. Press and hold the SELECT and ENTER buttons simultaneously for 3 seconds to activate the RS232 remote operating mode. The LT-1000 should display "**rS232**". The control of the LT-1000 test platform is now on your computer.
10. **On your computer**, open the EZ-Lab program. This file will be located in a folder titled "EZ-Lab" on your C drive. The file is titled "EZ-Lab".

11. Double click on the file "EZ-Lab". This will open the EZ-Lab System program and display the Main Screen. (See Screen 1 – EZ Lab Main Screen)
12. Select the "**Comm. Setup**" button and select the appropriate port for your computer connection. (Usually comm. 1)
13. After selecting the appropriate port, select the "**LT-1000**" button to activate the program. The operating screen will appear on your display. (See Screen 2 – Operating Screen)

REMOTE OPERATION

EZ-Lab is designed to provide all the necessary instructions on your computer screen. However, the following information will provide additional insight on the use of this system.



Screen 2 - Operating Screen

The main screen is divided into 2 sections. (See Screen 2 – Operating Screen) The left section, titled "**Load Setup**", is for the calibration of the load cell and choosing the units of measure. The right section, titled "**Run Test**", is for running a test, displaying test data, and system status.

CALIBRATION

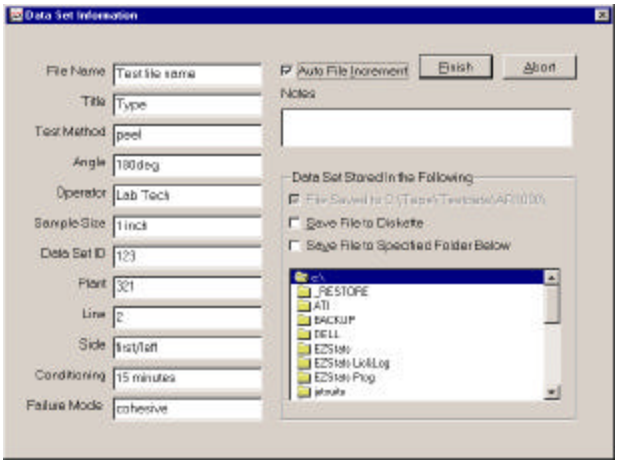
In order for the load cell to measure forces correctly it is necessary to calibrate the system. The following procedure describes the calibration process.

1. Move the Load Cell Assembly to the idle position.
2. Select the "**Calibrate**" button in the Load Setup section of the main screen.
3. Follow the on screen instructions exactly, and make sure to hang the appropriate weight on the Grip when entering the high calibration value.
4. Verify the calibration by hanging some other known weight on the Grip and checking the display in the current load field.

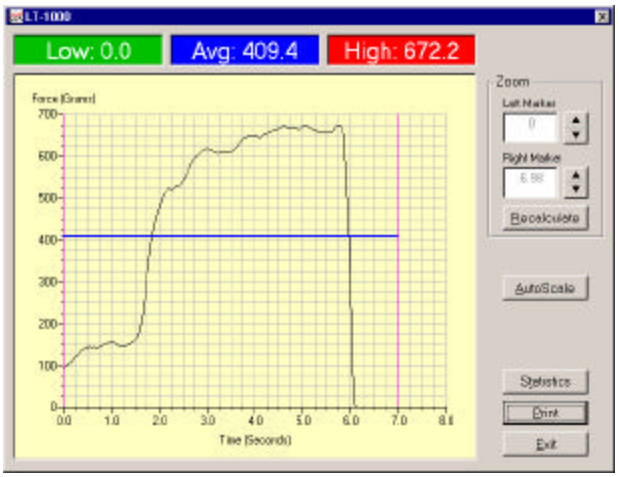
RUNNING A TEST

The test procedure is the same when using EZ-Lab as with the stand-alone system. The procedure for running the test is as follows.

1. Prepare a sample loop and place it into the Grip of the Load Cell.
2. Move the load cell assembly down from the idle position to the test position.
3. Select the "**Run Test**" button. (See Screen 2 – Operating Screen)
4. Push the **"Start"** button. The LT-1000 will automatically conduct the test and collect the data.
5. At the completion of the test, the display of your computer will change from the Main Screen to the "Data Set Information" screen. (See Screen 3 – Data Set Information)
6. You may enter as many notes as there are fields. You may even select the file name to be automatically incremented with each additional test.
7. You may also select an additional file folder to save your test data. The entries you make on this screen will be the default entries for the following test.



Screen 3 - Data Set Information



Screen 4 –Test Data Graph

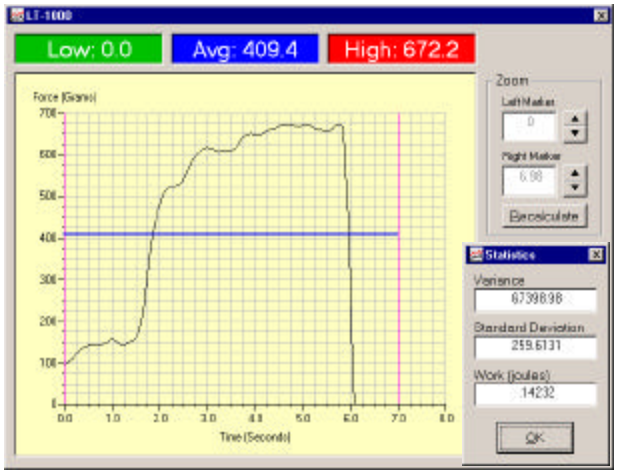
8. If you choose to not save the test data, simply select the "**Abort**" button.
9. Select the "**Done**" button when finished and the next screen will show your test data in graph form. (See Screen 4 – Test Data Graph)
10. The graph provides a cropping feature. Notice the red vertical lines at the left and right sides of the graph. You may move these lines by selecting the "**up**" and "**down**" arrow keys for both the "**Left Time**" and "**Right Time**".

11. Selecting the "**Recalculate**" button will re-graph the data between the two red vertical cropping lines.
12. Selecting the "**Auto Scale**" button will graph the data on a vertical scale that begins and ends with the values of the data being displayed. This feature provides dramatic presentation of cropped graphs.
13. You may recalculate up to three times. This cropped data graph may be saved as a file revision. The button for saving the file is located at the lower right of the display when available.
14. Select the "**Done**" button and proceed to your next test by repeating this procedure.
15. Any time the "**Print**" button appears, you may select it to print the current display.

STATISTICAL ANALYSIS

At the completion of each test basic statistical analysis values are established. In addition to the graphed data with the High, Low, and Average values the Standard Deviation, Variance, and Work have also been computed.

These last three values are not displayed on the graph with the High, Low, and Average. However, they are available by selecting and clicking on the button marked Statistics. (See Screen 5 - Statistical Graph) They also appear in the Review Data screen and with the Data Set Information when the Graph is printed.



Screen 5 –Statistical Graph

In addition to this individual test statistics, there is the ability to Tabulate and Overlay multiple test data files. Please see the next section.

TABULATE AND OVERLAY

There are two statistical analysis report formats available to the EZ-Lab System user. Tabulate and Overlay allow you to group multiple test files in a single report. Access to both of these formats is located on the Operating Screen at the bottom. There is a button identified as Tabulate and one identified as Overlay.

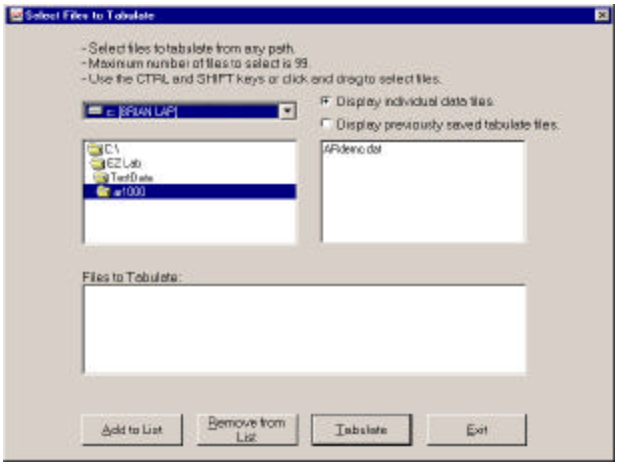
Clicking on either of these buttons will activate these features. The Tabulate feature allows you to select up to 99 files from your stored test data files and present them together in a spread sheet format. In addition, there are four summary values established at the bottom of the sheet. These four summary statistics are, the Average of averages, the average Work value, the Standard Deviation of all the Averages, and the Variance of the averages.

The Overlay feature allows you to select up to 5 individual test files for display on a single graph. The statistical data from each of the selected files is also presented in the tabulate format with the four summary values established at the bottom of the sheet.

The following procedure describes how to use these functions.

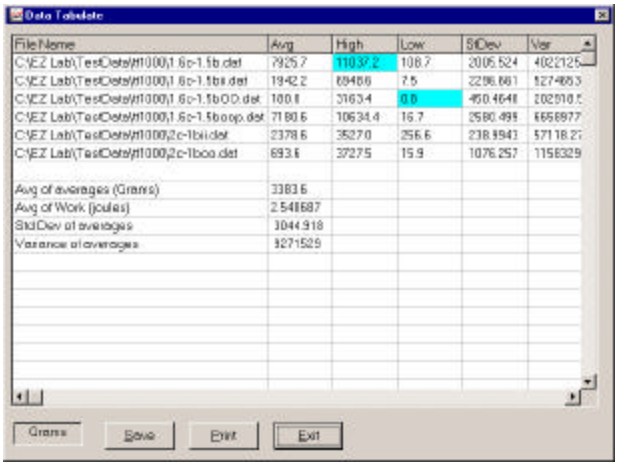
TABULATE

1. From the Operating Screen select the Tabulate button at the bottom of the screen. This will open the file selection window. (See Screen 6 – Select Files)
2. The windows on the left of the Select Files screen show the drive and file path for the test files that appear in the window on the right. Simply select the desired files in the window on the right and click on the Add to List button at the bottom. These selected files will now appear in the window at the bottom as selected files.



Screen 6 – Select Files

3. After you have selected all the files to be tabulated, simply click on the Tabulate button at the bottom. This action will open a new window with the selected files listed in a spreadsheet format. (See Screen 7 –Data Tabulate)

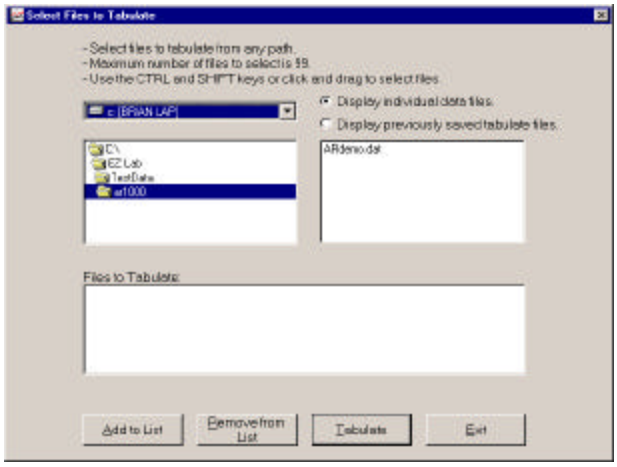


Screen 7 – Data Tabulate

4. Notice the summary statistics at the bottom of the sheet. You may click on the Print button to print this screen. There is also a button to save this list of test files in tabulated form as a separate file for later review.
5. When finished simply exit back to the Operating screen for continued testing or other choices.

OVERLAY

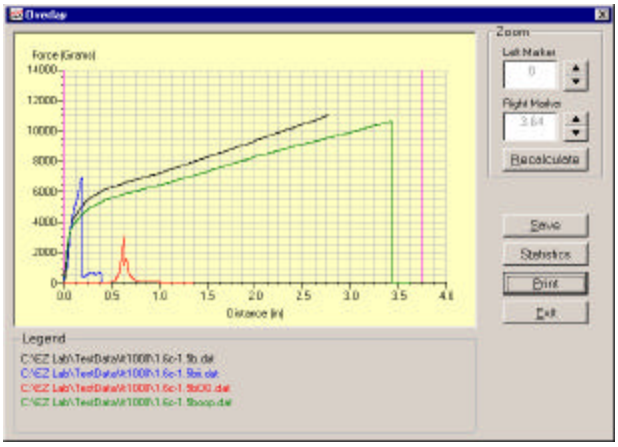
1. From the Operating Screen select the Overlay button at the bottom of the screen. This will open the file selection window. (See Screen 6 – Select Files)
2. The windows on the left of the Select Files screen show the drive and file path for the test files that appear in the window on the right. Simply select the desired files in the window on the right and click on the Add to List button at the bottom. These selected files will now appear in the window at the bottom as selected files.



Screen 6 – Select Files

3. After selecting the files to be overlaid, click on the Graph button. This will open a new window with the selected files graphed in individual colors on the same graph. (See Screen 8 – Overlay)
4. As with any graph screen in EZ-Lab you will find the familiar left and right margin cropping bars allowing you to select smaller areas of the graphed data for review.

5. At the Overlay graph screen there are buttons to save this file for latter review and a button to access the files in tabulated format. Simply select either button and notice the summary statistics at the bottom of the tabulate sheet.
6. When finished simply exit back to the Operating screen for continued testing or other choices.

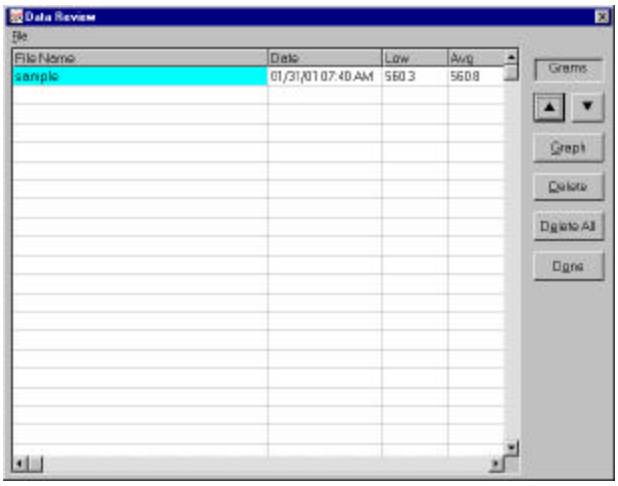


Screen 8 - Overlay

REVIEW TEST DATA

All of the test data that is collected in the EZ-Lab system is available for review. The following procedure describes the method of retrieving and reviewing your test data.

1. From the Operating Screen select the "**Review Data**" button. (See Screen 2 – Operating Screen)
2. This action will open the Data Review screen. (See Screen 9 – Data Review)
3. This screen will list the test data files that have been saved in the program's data file folder.
4. Select the file you wish to review by clicking on the name. Then select the action button to the right (**Graph** or **Delete**)
5. Should you desire to access other saved files from another location, select "**file**" located in the upper left of the Data Review screen.
6. This action will provide you access to your hard drive and other media connected to your computer. You can now select a file to open.



Screen 9 – Data Review

SAVING DATA TO EXCEL

Ez-Lab allows you to save your test data files in an Excel format for additional statistical review and display of the numerical values. The following procedure is used to accomplish this feature.

1. Select the Review Data button on the Operating Screen.
2. Select the file that you wish to save in an Excel format.
3. Click on the file button located at the upper left corner of the Data Review screen. (See Screen 10 – Data Review)
4. Select “Save as .xls”.
5. You will be able to select a location for saving the file and click OK.

You can now open that data file from Excel.

EXIT RS-232 MODE

To return the LT-1000 to the stand-alone operating mode, simply press the SELECT and ENTER control keys together for 3 seconds.

MAINTENANCE

As with any precision equipment it is important to provide care and maintenance to ensure proper performance and long life. The LT-1000 Loop Tack tester is a durable and well-designed piece of testing equipment requiring only minimal maintenance. Normal and weekly general cleaning is all that ChemInstruments recommends be done to maintain your LT-1000.

TROUBLESHOOTING

In the unlikely event you experience problems with your LT-1000 Loop Tack tester, the following list of probable causes and corrective procedures may provide a solution.

Problem	**Probable Cause**	**Procedure**
SE Full message	20 test have been collected	Refer to Delete
No Data collected	Sample not attached	See Test Procedure
	Not in Run Menu	Refer to Running a Test
Data measurement consistently Low/High	Improper calibration	Check calibration
	Bad calibration	Refer to load cell calibration
Calibration drifts	Bad or damaged load cell	Replace load cell